From glowbugs@theporch.com Fri Sep 20 02:40:25 1996
Return-Path: <glowbugs@theporch.com>
Received: from uro (localhost.theporch.com [127.0.0.1]) by uro.theporch.com
(8.8.Beta.5/AUX-3.1.1) with SMTP id CAA11562; Fri, 20 Sep 1996 02:35:03 -0500
(CDT)
Date: Fri, 20 Sep 1996 02:35:03 -0500 (CDT)
Message-Id: <199609200735.CAA11562@uro.theporch.com>
Errors-To: ws4s@midtenn.net
Reply-To: glowbugs@theporch.com
Originator: glowbugs@theporch.com
Sender: glowbugs@theporch.com
Precedence: bulk
From: glowbugs@theporch.com
To: Multiple recipients of list <glowbugs@theporch.com>
Subject: GLOWBUGS digest 296
X-Listprocessor-Version: 6.0c -- ListProcessor by Anastasios Kotsikonas
X-Comment: Please send list server requests to listproc@theporch.com
Status: O

GLOWBUGS Digest 296

Topics covered in this issue include:

Date: Thu, 19 Sep 1996 08:50:51 -0700
From: jeffd@coriolis.com (Jeff Duntemann)
To: glowbugs@theporch.com
Subject: Lindsay Books catalog and coil winder book info
Message-ID: <1.5.4.32.19960919084807.00eabdc8@ntserver.coriolis.com>

Hi guys--

Here's the scoop on Dave Gingery's build-your-own-coil-winder book.

BUILD A UNIVERSAL COIL WINDING MACHINE
By Dave Gingery
8 1/2 X 11, 24 pages, $8.95

From: Lindsay Books
PO Box 538
Bradley IL 60915-0538
815-935-5353

They have a quarterly pulp catalog that lists everything they offer, which includes a lot of 30's-40's tube stuff (my favorite there is RADIO FOR THE MILLIONS) including a reprinted 50's RCA Receiving Tube Manual. Also stuff about welding, machine work, "ancient technology" and odd lots that defy categorization. I've spent HUNDREDS of bucks on their stuff, and it's all very good.

Call 'em and get that catalog!

--73--

--Jeff Duntemann KG7JF
Scottsdale, Arizona

Date: Thu, 19 Sep 1996 09:06:25 -0700
From: jeffd@coriolis.com (Jeff Duntemann)
To: glowbugs@theporch.com
Subject: 12V space charge tubes
Message-ID: <1.5.4.32.19960919090342.00ecb0a4@ntserver.coriolis.com>

Last night I sat and listened to 75m while I tallied up the 12V space charge tubes in my 1965 RCA receiving tube manual, and pulled the files on circuits for said tubes. 75 was pretty dead--but I got a good list together. These are the 12V B+ tubes I discovered. It may not be all of them, but it's quite a list:

12AB5
12AC6
12AD6
12AE6
12AE7
12AF6
12AJ6
12AL8
12BL6
12CN5
12CX6
12DE8
12DK7
12DL8
12DS7
12DV8
12AE6
12EC8
12EG6
12EK6
12EL6
12EM6
12F8
12FK6
12FM6
12FR8
12FX8
12GA6
12J8
12K5
12U7

All the tubes here I spot checked show 150ma on the filaments.

For some circuits, look for these:

August 63 CQ, page 23--10 meter converter
August 19, 1960 ELECTRONICS, page 62--designing receivers with 12V tubes
January 57 RADIO & TELEVISION NEWS, page 47, concept piece on low plate potential tubes
June 64 QST, page 11, high-performance 5-band converter portion of a mobile rig. This one is cool; it's half of a receiver using 12V tubes; the catch is that it also uses 1600kc IF can transformers. It's basically a first mixer and IF strip to make a car radio into a double conversion AM/CW receiver. You could add a simple detector/audio stage to make it a complete receiver. I'll do it if I ever find a set of 1600KC cans, or figure out how to sub in 455kc cans. (I'd actually prefer the higher IF for image reasons,

so I'm still looking.)

If anyone has a good, sensitive regen circuit using one of these tubes I'd like to get it; I want to make a "one-tube radio" kit for my nephews and my sister in law has set 12V as the top limit for "projects" as the boys call them.

Again, I'd like to hear the experiences of others using these tubes or "normal" tubes in space charge mode.

--73--

--Jeff Duntemann KG7JF
  Scottsdale, Arizona

Date: Thu, 19 Sep 1996 12:38:16 -0400 (EDT)
From: rdkeys@csemail.cropsci.ncsu.edu
To: cfb@bga.com
Cc: rdkeys@csemail.cropsci.ncsu.edu (), glowbugs@theporch.com
Subject: Re: Advice on tube cutoff frequency.
Message-ID: <9609191638.AA101281@csemail.cropsci.ncsu.edu>

>
> Hi again,
>
> I've been quiet for a little while - working on my 6LR8 based CW TX. I have
> run into a problem that I believe may make this tube a bad choice for 40M.

If it is a modern tube, and it is, it will oscillate fine up through 40M.
It is more likely something is off in the rig parts or adjustments.

> A couple of serious caveats are in order, though. Some of the component
> choices in the book are not right. For example, there is a bleeder resistor
> across the power supply output. At 47K with 280V, the specified 1W resistor
> is quite underrated for the roughly 1.6W it actually dissipates.

For a bleeder resistor you want to pass about 1-5 percent of the power supply load if it is a non-regulation bleeder. If the bleeder is used to regulate the power supply, sometimes done in cheap brute force power supplies, then it needs to pass about 10-25 percent of the power supply current.

A 47K resistor is not out of place at 300 volts, but I would rate the beast at 10 watts minimally, and probably 50 watts optimally.

For a plain bleeder that does not regulate I would use 100K ohms per

100 volts of HV down to 50K ohms per 100v of HV. That would make a
300K ohm resistor the minimal bleeder, and maybe a 150K or 100K
a better choice. The 47K is not out of place, but is drawing enough
current to partially regulate the HV, so you need to have sufficient
current handling capacity x 3 for a proper design.

For a regulating bleeder, you should dissipate about 20% of 50 watts
or 10 watts in the bleeder. At 300 volts, that is a 10w/300v=33 ma load.
That is 3.33 watts per 100 volts or 100x100/3.33=3000 ohms per 100 volts.
That would be about a 10K resistor at 10 watts absolute minimum dissipation.
Optimally 3-5 times that capacity would be used or a 50 watt resistor.

Thus, the 47K resistor is not out of place, but woefully underrated.
I would suggest minimally a 5 watt 47 K resistor and better a 10 watt or
20 watt size.

It is common knowledge that 4 watt, 7.5 watt, and 10 watt lamps make great
bleeder regulators for OT rigs at about 75-90 volts per lamp. Go figure,
for any rig you want. Such knowedge was common in the 30's but is a bit
rusty for the modern era. The lamps are cheap resistances, but the sockets
are a real killer at the Home Depo. But, if you have the space in your rig
or power supply and have the lamps and sockets they really work well.

Also, for filament bypass centertap resistors, 4 watt night lights or
xmas tree big lights or auto dome lamp lights are great. That is mainly a
hint for the OT filament driven oscillator/amplifier crowd.

> Secondly, and this is where I need some advice/confirmation, while it seems
> to work OK on 80M, on 40M it does not emit at all well.

Stuff deleted for brevity.

Sounds like one of several things are possibly happening.

1. Voltage on the tubes may be low on the plate. Forget using the plate
    dropping resistors with 300 volts on the plates. Maybe a little
    resistance for isolation, say 1K or so, but probably not much more.
    Put an RF choke there for impedance load coupling. Use a coupling
    cap of 250-1000 pf for coupling between stages. Only if the
    oscillator runs very hot or pulls significantly might you need to
    reduce the plate voltage on the oscillator, or reduce coupling.

3. Biasing is off. Check the grid bias resistors and cathode bias
    resistors. These will control the gain of the tubes. At low
    voltages, little bias is required. At higher voltages more bias
    is required. The greater the driving voltage, the greater the
    bias required. For low output, the biasing may be too high.
    Conversely, if the bias is very low, the output may be way higher

than expected and the plates glow very nicely red or white.

3. Drive is insufficient between stages. Check the coupling caps. Too low a value gives too low driving power. Too high a value will pull the oscillator. Any value between 100pf and 0.01 can be used for coupling. You need to find the right value. For a weak xtal, the value may be more than for a snappy xtal, that is assuming the oscillator does not pull from the weak xtal.

4. Parasitics are present. This is highly likely. Especially if your plates are glowing dull red. Put a small grid choke in the amplifier grid of say 5 turns on a 1-10K resistor and maybe even put a 3-5 pf capacitor across the coil. Usually the grid choke is a last resort. I would place it in the plate before in the grid. In the grid, if there were a grid biasing resistor, I would isolate the grid resistor from the grid with a 2.5 millihenry RF choke. The combination of those two should cure parasitics. The plate parasitic choke should look just like the ones on yer standard novicey style DX-60, etc.

> Any advice anyone could give me will be welcome. Has anyone else built this
> actual device? If so, how did it go?

I have not built that one, but I would offer that there is a lot of good hints and kinks on curing ills in 1 and 2 stage transmitters in the early ham handbooks, particularly the 30's era. For some reason, later handbooks left a lot of that kind of stuff out.

> Do not misunderstand, I am neither discouraged, nor depressed - I have
> learned a lot thus far. In fact, with the problems I'm having, it's been a
> bit of a deep end experience. If I end up with a 15W 80M only rig, I'll
> still be happy. I'll just have to come up with a design for a more powerful
> tube based 40M rig as my next project!

Are we having fun, yet? Sure, that is part of tinkering with ham radio.

Remember, your output is only going to be about half of your input. So 15 watts out is 30 watts input.

My gut feeling is that it might be parasitics eating your power.

Optimal tubes for a classic 2 stage rig are usually the 6AG7 and 807 or 6AG7 and 6146. You can't do much better than that for a 50-75 watt rig.

> Lastly, my nice, fresh call letters are KC5VQL.
> Cheers,
> --
> Chris F. Broadbent

Go for it Chris!

Welcome aboard!

73/ZUT DE NA4G/Bob UP

Date: Thu, 19 Sep 1996 11:45:55 -0600
From: "Deane D McIntyre" <dmcintyr@acs.ucalgary.ca>
To: glowbugs@theporch.com
Subject: Re: 12V space charge tubes
Message-ID: <9609191745.ZZ15986@ds1.acs.ucalgary.ca>

In message <1.5.4.32.19960919090342.00ecb0a4@ntserver.coriolis.com> writes:
>
> Last night I sat and listened to 75m while I tallied up the 12V space charge
> tubes in my 1965 RCA receiving tube manual, and pulled the files on circuits
> for said tubes. 75 was pretty dead--but I got a good list together. These
> are the 12V B+ tubes I discovered. It may not be all of them, but it's
> quite a list:
>
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> 12AF6
> 12AJ6
> 12AL8
> 12BL6
> 12CN5
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> 12DE8
> 12DK7
> 12DL8
> 12DS7
> 12DV8
> 12AE6
> 12EC8
> 12EG6
> 12EK6
> 12EL6
> 12EM6
> 12F8

> 12FK6
> 12FM6
> 12FR8
> 12FX8
> 12GA6
> 12J8
> 12K5
> 12U7
>
> All the tubes here I spot checked show 150ma on the filaments.
>

Guess what I was also doing last night.....

Instead of using a 49 as I posted in the Hiker's Radio, and reading Jeff's idea of using 12V auto radio tubes I dug out the GE, RCA and Sylvania tube books and scanned through the 12V tubes.

I was most interested in tetrode tubes specifically designed to be operated in the space charge mode. I found the following:

12AL8 Space charge tetrode/Medium mu triode Filament current 0.55A
12DL8 Space charge tetrode/Twin Diode Filament current 0.55A
12DS7 Space charge tetrode/Twin Diode FIlament current 0.4A
12K5 Space charge tetrode Filament current 0.4A

In all of these tubes,the characteristics of the tetrode section are similar. They operate with 12.6 volts on both plate and space charge (inner) grid. Contact potential only is used to develop bias on the control (outer grid), using a 2.2 meg leak.
The plate current is ca. 40 ma (depends greatly on the contact potential etc), the space charge grid current about 70 ma, and the plate resistance about 500 ohms; these tubes are designed to operate into a ca. 800 ohm load. The amplification factor is about 8. They were designed to give about 40 ma audio from a 2.5 V (pp I think) audio input.

Going through my tube stash I found a NIB 12K5 (had ordered it at one point thinking it to be the 12V version of the 6K5, a octal triode, and was suprized when I received a tiny box with a 7-pin minature tube inside :).

So guess what my next project is....

> If anyone has a good, sensitive regen circuit using one of these tubes I'd
> like to get it; I want to make a "one-tube radio" kit for my nephews and my
> sister in law has set 12V as the top limit for "projects" as the boys call

> them.
>
Will let you know how it works.....I have an eight year old nephew also interested in "projects", his name is Jeff..

73, Deane D McIntyre VE6BPO
dmcintyr@acs.ucalgary.ca

Date: Thu, 19 Sep 1996 14:59:23 -0400 (EDT)
From: rdkeys@csemail.cropsci.ncsu.edu
To: dmcintyr@acs.ucalgary.ca
Cc: rdkeys@csemail.cropsci.ncsu.edu (), glowbugs@theporch.com
Subject: Re: 12V space charge tubes
Message-ID: <9609191859.AA101396@csemail.cropsci.ncsu.edu>

> Guess what I was also doing last night.....

Having FUN of course!

> 12AL8 Space charge tetrode/Medium mu triode Filament current 0.55A
> 12DL8 Space charge tetrode/Twin Diode Filament current 0.55A
> 12DS7 Space charge tetrode/Twin Diode FIlament current 0.4A
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> bias on the control (outer grid), using a 2.2 meg leak.
> The plate current is ca. 40 ma (depends greatly on the contact
> potential etc), the space charge grid current about 70 ma,
> and the plate resistance about 500 ohms; these tubes are designed to
> operate into a ca. 800 ohm load. The amplification factor is about 8.
> They were designed to give about 40 ma audio from a 2.5 V (pp I think)
> audio input.
>
> So guess what my next project is....

Well, Deane, it has gotta be a regenerator OR.....

A Low Voltage Supercalifragilisticexpaidocious Hartley Oscillator!

Using RCA's 1927 Tetrode Hartley oscillator design (C.F. Sterling's Radio Manual, 1929 edition or maybe 1927 edition) from the ET-3655 HF marine radio transmitter which used a 100 watt tetrode Hartley master

oscillator), it should work quite well as a tetrode xtal oscillator or self-controlled Hartley oscillator.

With 12 volts on the plate at 40ma that gives about half a watt input. Set up into a High-C Hartley circuit, maybe even a Push-Pull circuit, that would give a watt input.

In a regenerator mode, that should work quite well. My guess is a tickler circuit would work best with an audio transformer as an inerstage coupler (from an old auto radio maybe), although impedance coupling should work well at that low voltage. I would suggest that maybe resistance control of regeneration in the screen circuit might not be good, since the current is so high. Throttle condenser control or that coupled with variable tickler control would be best methinks. One probably wants full 12 volts everywhere, and not too much less.

Me wonders if that would work with the screen grid and plate tied together as a low impedance triode.

Hmmmm, now ye gots me curious, an' ready to scurry back into the dusty toob boxes.....(:+}}..... Mebbee I will have to make a mini-to-5-pin adapter so I can try one out in place of me '27 bottles.

Moove over xsistors, firebottles are back in style!

73/ZUT DE NA4G/Bob UP

Date: Thu, 19 Sep 1996 12:31:49 -0700
From: mjsilva@ix.netcom.com (michael silva)
To: glowbugs@theporch.com
Subject: Re: Advice on tube cutoff frequency.
Message-ID: <199609191931.MAA02246@dfw-ix6.ix.netcom.com>

You guys have done a great job in answering Chris's questions, and I just wanted to comment a little on the drive levels out of his oscillator. The 8v out on 40m is quite low (even the 16v on 80 sounds low) to drive a class C output stage. As a rough guess, remember that your grid drive has to go between cutoff (more, actually, for class C) and typically some positive value. For example, in one of the RCA TX tube manuals they do the numbers on a 6146 and it ends up requiring about 80 volts of drive for full output (from about -65 to +15). At the lower voltage levels used in Chris's rig I'd still expect maybe a 30 volt drive requirement as a rough guesstimate. I'd look for ways to increase the oscillator output (choke in plate lead, fiddle with grid

resistor and/or feedback components, another crystal,...)

73,
Mike, KK6GM

Date: Thu, 19 Sep 1996 19:00:23 -0400 (EDT)
From: "Barry L. Ornitz" <u856010@eastman.com>
To: Glowbugs Mailing List <glowbugs@theporch.com>
Cc: michael silva <mjsilva@ix.netcom.com>
Subject: RE: RF Chokes (Homebrew and otherwise)
Message-ID: <Pine.ULT.3.91.960919182649.11104C-100000@dua150.kpt.emn.com>

On Thu, 19 Sep 1996, Mike Silva asked:

> First, does anyone know the typical insulation breakdown rating on
> magnet wire? I'm wondering about the RF voltage breakdown between any
> two layers of a back-and-forth winding, should I want to try winding my
> own.

This is a rough one since there are so many materials used for magnet wire insulation. The early varnished wires have quite poor insulation properties, while the modern Formvar and polyamide insulations are pretty good. The old cotton covered wire is pretty poor in insulation breakdown unless it is vacuum impregnated with an insulating varnish after it is wound. If the insulation comes off easily at soldering temperature, be wary. The most modern insulations really are a _pain_ to remove.

You can test the magnet wire fairly easily. Use a high value resistor in series with a piece of the wire. Bend the wire in a loop and stick the insulated portion of the loop in some salt water. Hook a high voltage source to the resistor and the return lead onto a bare wire stuck in the water. Place a voltmeter across the resistor and slowly increase the voltage until the meter suddenly jumps upward. Turn off the power and remove the wire from the water. Then carefully reapply power and measure the voltage from the resistor to the return. This is the breakdown voltage of the insulation. When winding your coil, use a fraction of this value (like 10%) to provide a good safety factor. The resistor is used only to limit the fault current.

This is why, when winding transformers, after each layer is applied, it is common to place a think piece of insulation on to separate the next layer. In this case, the wire insulation only has to withstand the turn-to-turn voltage difference, not the layer to layer difference.

> Secondly, I know chokes have one or more resonances, both series and

> parallel. When I look at choke specs they just seem to list one
> resonant frequency. I've always assumed that frequency that was the
> (first) parallel resonance -- is that always true? Where -does- the
> first series resonance "typically" occur relative to the first parallel
> resonance in an RF choke?

Often the frequency listed is the test frequency where the coil is expected to have its highest Q, and it has nothing to do with the series resonance. I have always found you need to use the grid-dip oscillator if resonance is important. Different manufacturers give different data, however, so it is best to always read the fine print.

     73, Barry L. Ornitz WA4VZQ ornitz@eastman.com

Date: Thu, 19 Sep 1996 17:04:25 -0700
From: jeffd@coriolis.com (Jeff Duntemann)
To: glowbugs@theporch.com
Subject: Making your own IF transformers
Message-ID: <1.5.4.32.19960919170140.00ec6938@ntserver.coriolis.com>

Hi guys--

For years I've thought about building my own IF transformers for tube projects. I haven't tried it yet, but before I give it a shot I wanted to flash my concept past the experts here to see if there are any howls.

As I understand it, there are two major adjustable quantities in an IF can: The resonant frequency of each of the two sides of the transformer, and the degree of coupling between the two windings. In my design I intend to use traditional trimmers to adjust the resonant frequencies, and a system that fixes one winding and allows the other to move up and down to adjust the degree of coupling.

In most commercial transformers, a ferrite or iron powder slug is used to adjust the degree of coupling. I want to avoid this because I want the design to be duplicatable, and finding a standard source of ferrite slugs (especially with a brass threaded rod sunk into them) is problematic.

So picture this: A disk of double-sided PC board about 2" in diameter with a 4" length of 1/4" polystyrene rod attached to the center of the disk with a 6-32 nylon screw. The two windings are wound on thin tubing that telescopes snugly over the 1/4" poly rod. The bottom winding is wound on a short length of this telescoping tubing (probably no more than 1" long) and glued in place to the poly rod close to the bottom of the assembly. The other inductor is wound near one end of a 4" length of the same telescoping

tubing. This one isn't glued to the poly rod, but can be raised and lowered by pulling or pushing on the top end of the tubing, thus bringing the two windings either closer together or farther apart as needed by the desired degree of coupling. (The amount of travel only needs to be half an inch or less, I suspect.)

For a shield can I intend to use a 4 1/4" length of 1 1/2" copper pipe. Copper may seem like wretched excess, but the pipe is available everywhere and doesn't cost much at all if you're only buying a couple of feet. I'll solder a plain copper pipe cap to one end of the shield can length of pipe, after drilling three holes in the top: One 3/8" hole at the center to let the upper end of the telescoping tubing through for coupling adjustments, and two smaller holes on either side of the center, spaced to allow access to the trimmers at the bottom with an appropriate diddle stick. There will be two "aimer" brackets over the trimmers so that the combination of the hole in the pipe cap and the hole in the aimer bracket will "aim" the diddle stick right into the trimmer adjustment screw.

At the other end of the shield can I'll put a pair of 6-32 spade bolts for fastening the assembly to the chassis. The spade bolts go *through* mating holes in the 2" PC board disk, so that the shield can is not otherwise mechanically attached to the transformer and can be removed for fooling-with without having to disconnect the transformer. When in place, the shield can holds the transformer in place as well. A 1 1/8" hole (the size of an octal socket) is punched through the chassis where the transformer is to be mounted. Lugs are placed on the bottom face of the PC board to allow connection into the circuit.

The windings will be scramble-wound #32 Formvar enamel. (I have a 7000-foot roll of the stuff!) I've done scramble-wound chokes in the past by chucking the form in an AC hand drill and slowing it down with a homebrew motor speed control. I know IF cans are wound with Litz wire, but that's become unobtainium, pretty much. Again, I want somebody to be able to duplicate the design without having to scavenge ancient parts for Litz wire.

The points about which I'm unsure are these:

* Is sliding one winding up and down to adjust its distance from the other winding an effective method of controlling the coupling? I've never seen this done on a commercial IF can. Is there any downside vis-a-vis using a slug down the middle?

* Is there any nonobvious downside to using a copper shield can as opposed to aluminum? Keep in mind the distance from the windings to the can is about the same as in GT-era IF cans.

* What effect will using #32 enamel wire instead of Litz wire have on the performance of the transformer? I've never entirely understood why Litz

wire was so good. More surface area for RF to travel on? Is it just that simple?

My target IF frequency is 1.6 or 1.7 mc.

So. Whaddaya think? I hope to get one of these made this fall, just for fun. If it works I'll make another, and then I'll have everything I need to make a 160-80 receiver for my dreamed-of all-homebrew AM station.

--73--

--Jeff Duntemann KG7JF
  Scottsdale, Arizona

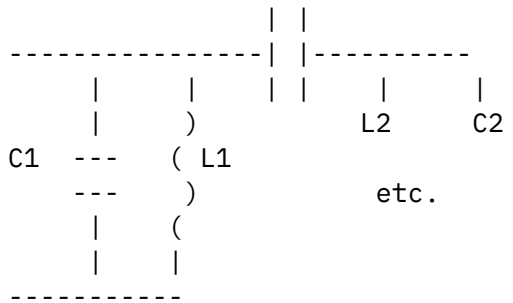
Date: Thu, 19 Sep 1996 18:43:05 -0700 (PDT)
From: John Kolb <jlkolb@cts.com>
To: Jeff Duntemann <jeffd@coriolis.com>
Subject: Re: Making your own IF transformers
Message-ID: <Pine.SCO.3.91.960919183528.12400A-100000@sd.cts.com>

On Thu, 19 Sep 1996, Jeff Duntemann wrote:

> For years I've thought about building my own IF transformers for tube
> projects. I haven't tried it yet, but before I give it a shot I wanted to
> flash my concept past the experts here to see if there are any howls.
>

Solid wire should work just fine at 1.6 MHz.

Rather than make mechnically adjustable, why not make the two
inductors on two toroid cores, and use capacitive coupling?
Should be both simpler and smaller.



John Kolb KK6IL jlkolb@cts.com

Date: Thu, 19 Sep 1996 21:54:10 -0400
From: "Gregory S. Raven" <gsraven@cris.com>
To: glowbugs@theporch.com
Subject: Re: Making your own IF transformers
Message-ID: <2.2.32.19960920015410.006a3e98@pop3.cris.com>

At 07:04 PM 9/19/96 -0500, you wrote:
>Hi guys--
>
>For years I've thought about building my own IF transformers for tube
>projects. I haven't tried it yet, but before I give it a shot I wanted to
>flash my concept past the experts here to see if there are any howls.
>As I understand it, there are two major adjustable quantities in an IF can:
>The resonant frequency of each of the two sides of the transformer, and the
>degree of coupling between the two windings. In my design I intend to use
>traditional trimmers to adjust the resonant frequencies, and a system that
>fixes one winding and allows the other to move up and down to adjust the
>degree of coupling.

You are missing one major variable: the Q of each of the resonators. This will dictate the coupling factor required for a flat frequency response and also the bandwidth of the coupled filter.

>In most commercial transformers, a ferrite or iron powder slug is used to
>adjust the degree of coupling. I want to avoid this because I want the
>design to be duplicatable, and finding a standard source of ferrite slugs
>(especially with a brass threaded rod sunk into them) is problematic.

Well, the slugs adjust the resonant frequency. The coupling is essentially fixed by the physical configuration of the 2 coils. Usually the 2 coils are on the same axis (at least the ones I have dismantled), and the coupling factor is adjusted by the distance between them. The slugs probably have some minor impact on the coupling factor, but the primary variable is the spacing between the coils.

>The points about which I'm unsure are these:
>
>* Is sliding one winding up and down to adjust its distance from the other
>winding an effective method of controlling the coupling? I've never seen
>this done on a commercial IF can. Is there any downside vis-a-vis using a

>slug down the middle?

Yes, it will work. The commercial IF cans were designed for a particular bandwidth, and as such they had a fixed coupling. I have heard that the coupling was determined empirically, even though there are formulae for this. Also, the shield can will affect the Q of the coils and also the coupling factor, but I don't recall seeing a formula taking the shield into account.

One exception was the IF coil in the ARC-5 LF receiver. This IF coil has a 2 position adjustment allowing for wide or sharp bandwidth. The spacing between the primary and secondary is changed by about a quarter inch to get the 2 settings.

>* Is there any nonobvious downside to using a copper shield can as opposed
>to aluminum? Keep in mind the distance from the windings to the can is
>about the same as in GT-era IF cans.

Copper and aluminum are both good conductors. There might be some slight difference in the inductance and Q, but I bet you can't measure it between the 2 materials.

>My target IF frequency is 1.6 or 1.7 mc.

You will have to have one whopper Q factor to get good selectivity at this frequency. For example, the coils in the 455 kHz IFs in AM broadcast radios have a Q of about 100. That is a pretty good Q, and the resultant bandwidth is 2 times square root of 2 times coupling factor time resonant frequency. The coupling factor for flat response assuming equal Q for the primary and secondary is 1/Q. So the 3 dB bandwidth is 2*1.414*0.01*455kHz= 12.9 kHz which is about right for a 10 kHz wide AM signal. To get the same bandwidth, you would have to have a Q of 350. Assuming you want decent selectivity on the crowded ham bands, you better go for something like 2 kHz, for which you would need a Q of 2333 !!!!

This is why the ARC-5 and triple conversion ham receivers went to very low IFs like 50 or 80 kHz to achieve good selectivity using LC filters. Even the modern Drake R8 uses a very low IF frequency to achieve this. Of course, the image problem has to be solved using triple conversion or image cancelling mixers in the case of the Drake.

73 de Greg KF5N, landline FA
Collector of Landline Telegraph
Secretary/Treasurer TP Chapter MTC
Visit "Telegraph Lore"
http://www.cris.com/~Gsraven/

Date: Thu, 19 Sep 1996 21:17:26 PST
From: wj5j@juno.com (John D Hensley)
To: boatanchors@theporch.com
Cc: glowbugs@theporch.com, keyclicks@theporch.com
Subject: Magazines available
Message-ID: <19960919.212023.7951.0.wj5j@juno.com>

Hello to everyone,

I have some magazines available to anyone
who wants them in return for almost anything
junk box related as trade. (Think homebrew !)
Will hold for seven days and award to heaviest
junk box offer. Otherwise they are going to the
recycle bin where they probably belong :^) -

(A) QCWA Journal: 10-12 years continuous,
including several member directories; occasional
articles of BA interest.

(B) Morse Telegraph Club newspaper, late
80's, about 1 1/2" to 2" of reading.

(C) a few scattered issues of AWA Journal,
punctuated by a few back issues of Tucker's
Electronics catalogs, highlighted by a few
Heath catalogs from the 70's-80's, finished
off by one Allied Radio Catalog, probably from
the late 60's or early 70's.

(D) Poor condition, but probably complete,
manual for Heathkit SB-401 xmtr

Contact via private post < wj5j @! juno.com >

73, Doug

********** WJ5J / NNN0BXX **********
Wanted: Mech filter switch & rear 2 eccentric gears,
3kc & 1kc filters, Collins name tag, all for r388a/51J4.
Searching for KS1 p.s. for KL1, EV664 for parts, Nat'l
rack spkr, coil holder, and xcal for HRO-60R. T I A.
********** wj5j @ juno.com **********

End of GLOWBUGS Digest 296
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